

Memo

Date: May 2, 2023

To: Dr. Brennan Pursell

From: Alanna Hartzell

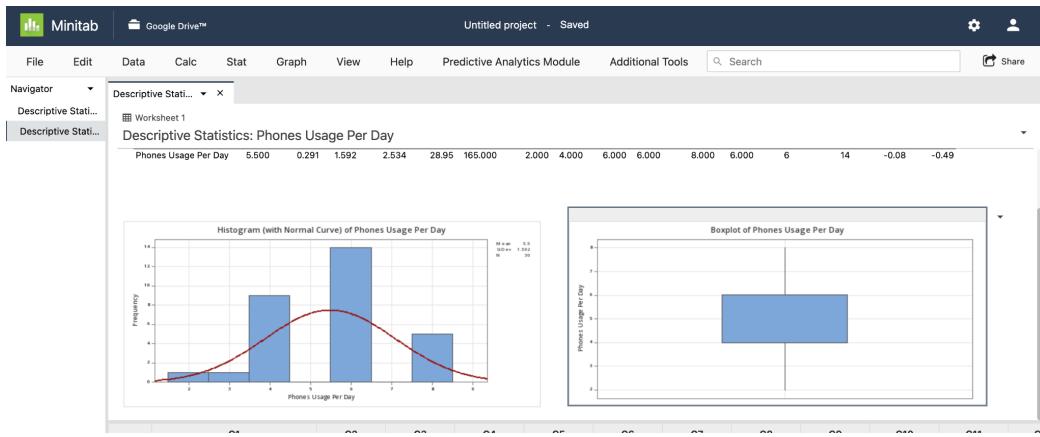
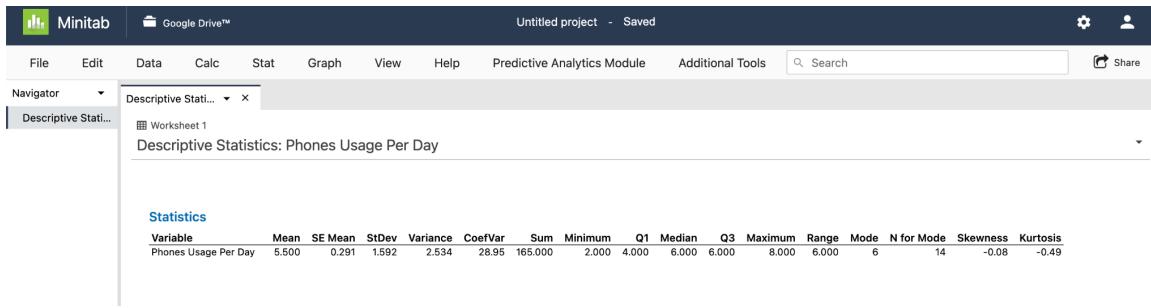
Subject: Cell Phone Usage Among DeSales University Undergraduate Students

1. Introduction / Overview

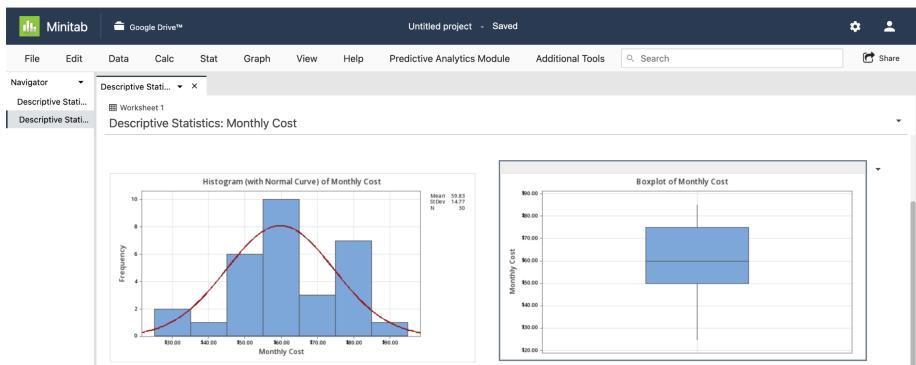
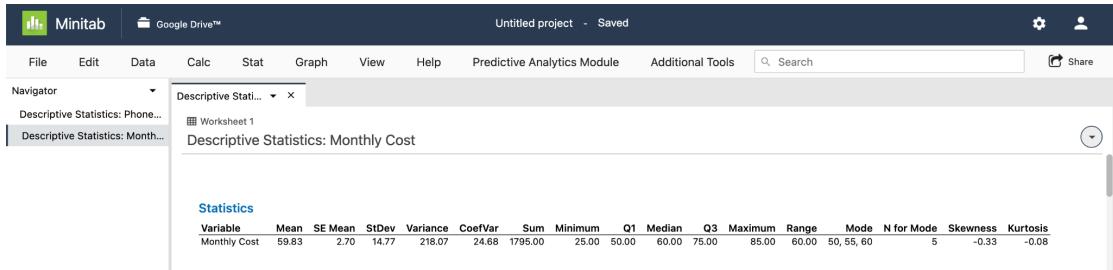
Technology and the use of electronics have become prominent in today's society. Additionally, the use of cell phones has become a daily and common activity. Studies have shown the negativity surrounding cell phone usage which includes links to both mental disorders such as depression and anxiety and physical health issues as well. Nonetheless, people are becoming addicted to their cell phones, lessening interpersonal skills and distracting them from important aspects of life. The increase in cell phone usage is affecting individuals on a personal level. I feel passionate about this topic because I have personally noticed many negative effects of excessive cell phone use in my own life. In this study, I use descriptive and inferential statistical analysis of data about cell phone usage among DeSales University Undergraduate students throughout their day.

2. Data Description

I surveyed Google Forms and sent it out to DeSales University Undergraduate students to complete. I used a convenience sampling method which is a non-probability method. The survey had been sent to peers of mine that I know from classes I have, the softball team I am on, and the clubs I am involved in. In terms of the fields I used in my analysis, the first field is hours spent using a phone per day which are interval numerical data.



The next two fields as if students check their phones when they wake up and when they go to sleep at night which are both nominal categorical data. The final field is how much students pay approximately per month for their cell phones and is ratio numerical data.



3. Statement of 2-3 Sets of Null and Alternative Hypotheses

Underclassmen at DeSales are likelier to spend more time on their phones than upperclassmen.

The null hypothesis (H_0) is that underclassmen are equal to or higher than others. The alternative hypothesis (H_1) is that upperclassmen are less than or equal to underclassmen.

If DeSales students spend more time using their phones during the day, they are willing to pay more for their cell phones per month. The null hypothesis (H_0) is that students using their phones the most pay the most for their cell phone plan per month. The alternative hypothesis (H_1) is that students using their phones the most spend less per month.

If DeSales students check their phones first thing in the morning, they are more likely to also check their phones at night right before going to sleep. The null hypothesis (H_0) is that students that check their cell phones in the morning also check them right before they go to sleep at night. The alternative hypothesis (H_1) is that students that check their phones first thing in the morning do not always check their phones right before they go to sleep or do not check their phones at all before bed.

4. Data & Analysis Methodology

For the first hypothesis, I used a 2-Sample T-Test to test the means between the number of time underclassmen spend on their phones per day compared to upperclassmen. This tool is appropriate because it describes whether the two variables are equal.

To analyze the second hypothesis, I used a Regression Test to find out if students are more likely to spend more money on their phones per month if they spend more time on their phones. This tool is appropriate to use because it shows if there is a relationship between the two variables.

Finally, for the third hypothesis, I chose to use the Chi-Square test to test if there is a correlation between students that check their phones first thing in the morning and students who check their phones right before they go to sleep at night. This tool is appropriate because it shows whether the two variables are independent of one another.

5. Results

2-Sample T-Test:

The p-value is 0.156 which explains why to keep the null hypothesis. This test result indicates that the mean time spent on cell phones for Underclassmen at DeSales is indeed higher than the Upperclassmen.

The screenshot shows the Minitab interface with the following details:

- Top Bar:** Minitab logo, Google Drive™, Untitled project - Saved, File, Edit, Data, Calc, Stat, Graph, View, Help, Predictive Analytics Module, Additional Tools, Search, Share.
- Left Sidebar (Navigator):** Two-Sample T-Test and CI: U... (highlighted), Two-Sample T-Test and CI: ...
- Current Analysis:** Two-Sample T-Test and CI: Upperclassmen, Underclassmen
- Method Section:** Describes the population means (μ_U and μ_L) and the difference ($\mu_U - \mu_L$). Notes that equal variances are not assumed.
- Data Table:** A 4x2 grid showing data for Upperclassmen and Underclassmen across four categories (C1-C4). The data is as follows:

	C1 Upperclassmen	C2 Underclassmen
1	6	8
2	6	8
3	4	4
4	8	6

- Bottom Navigation:** Worksheet 1

Minitab | Google Drive™

Untitled project - Saved

File Edit Data Calc Stat Graph View Help Predictive Analytics Module Additional Tools Search Share

Two-Sample T-Test and CI: U... Two-Sample T-Test and CI: ...

Two-Sample T-Test and CI: Upperclassmen, Underclassmen

Test

Null hypothesis $H_0: \mu_1 = \mu_2 = 0$
Alternative hypothesis $H_a: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
-1.52	11	0.156

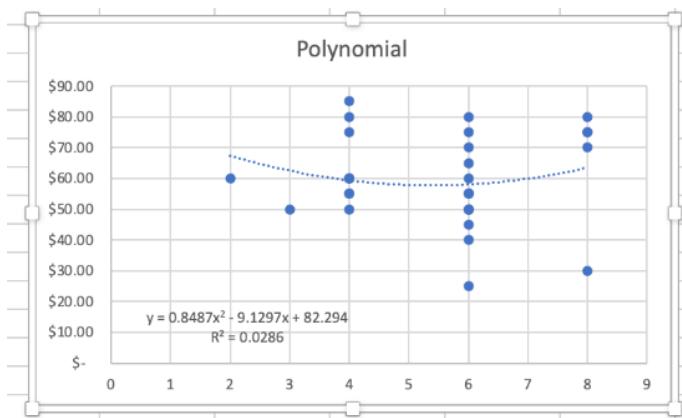
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
	Upperclassmen	Underclassmen									
1	6	8									
2	6	8									
3	4	4									
4	8	6									

Worksheet 1

Regression Test:

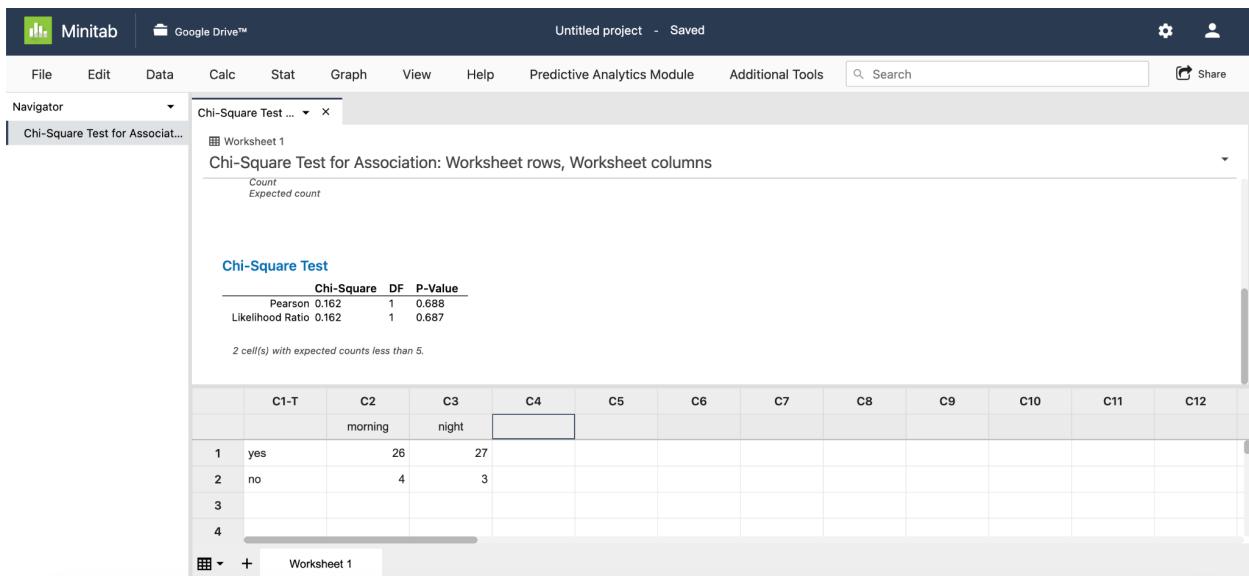
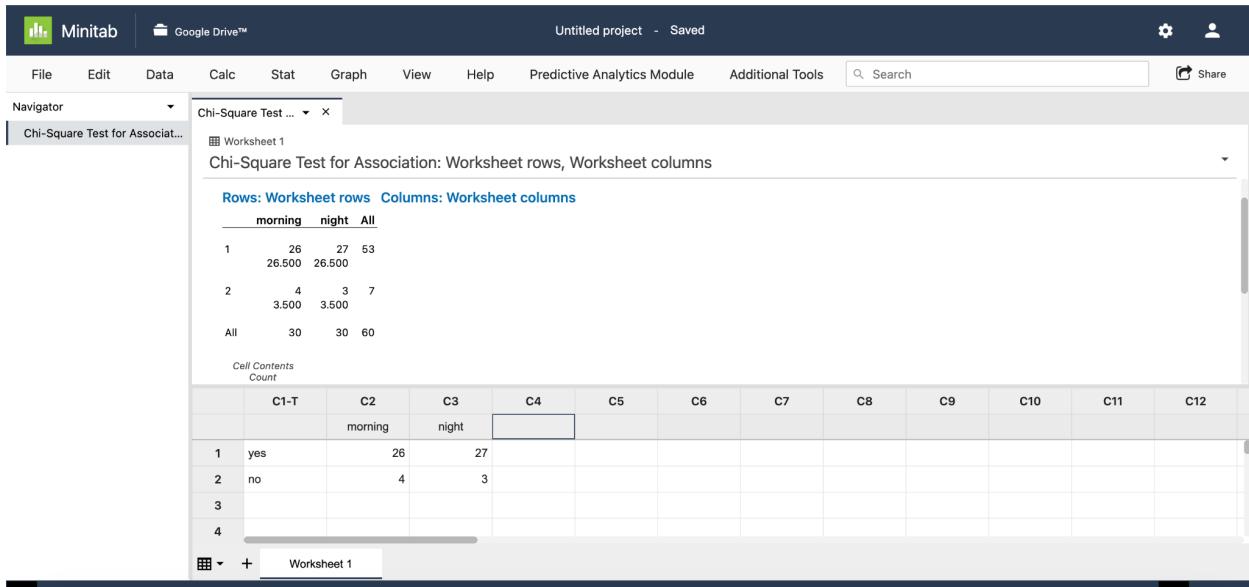
The p-value is 0.00 which explains why to reject the null hypothesis. There is no association between hours spent using a cell phone amongst DeSales undergraduate students and the price they pay per month for their phones.

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.01864133					
R Square	0.0003475					
Adjusted R S	-0.0366767					
Standard Err	1.64672434					
Observations	29					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	0.025451333	0.02545133	0.00938574	0.92353722	
Residual	27	73.21592798	2.71170104			
Total	28	73.24137931				
Coefficients						
	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0% Upper 95.0%
Intercept	5.36108033	1.292657611	4.14733204	0.0002994	2.708766	8.01339467
50	0.00202216	0.020872828	0.09688005	0.92353722	-0.0408053	0.04484967



Chi-Square Test:

The p-value is 0.688 which explains why to keep the null hypothesis. This indicates that there is a correlation between DeSales students that check their phones first thing in the morning and DeSales students that check their phones right before going to bed at night.



6. Conclusion

From the first test, it can be concluded that the younger underclassmen students at DeSales University tend to spend more time using their cell phones throughout the day compared to upperclassmen. This makes sense because as students progress through each year of college, the workload often becomes more strenuous. Therefore, there is less time to designate the distraction

that a phone could provide. In the second test, we learn that the number of hours spent using a cell phone per day amongst DeSales undergraduates does not correlate with the amount of money spent per month on the cell phone itself. Finally, in the third test, it is recognized that students that check their cell phones right when they wake up in the morning are more likely to also check their phones right before going to sleep at night. Overall, students are excessively using their cell phones and this could be affecting both their mental and physical health.

However, limitations within my study could have led to these conclusions. Because I am an upperclassman myself, my survey was sent to a majority of upperclassmen, creating survey bias. This could lead to coverage survey errors, making the data unreliable and unable to accurately represent the population of DeSales University undergraduates. Nonresponse errors could also be an issue with my research, as not every student filled out the survey that it had originally been sent to, creating nonresponse bias. I only collected responses from 30 DeSales undergraduates which only represents a very small portion of the population. To achieve more accurate results, a greater number of respondents would have to be involved.

To learn more about cell phone usage among DeSales University undergraduate students, further research is recommended and suggested.